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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/066,277	02/01/2002	Steven P. Cave	31305	4418
23589	7590	06/30/2005	EXAMINER	
HOVEY WILLIAMS LLP 2405 GRAND BLVD., SUITE 400 KANSAS CITY, MO 64108			LAROSE, COLIN M	
			ART UNIT	PAPER NUMBER
			2623	

DATE MAILED: 06/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/066,277	<b>Applicant(s)</b> CAVE ET AL.	
	<b>Examiner</b> Colin M. LaRose	<b>Art Unit</b> 2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 28 February 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-42 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Arguments and Amendments*

1. Applicant's amendments and arguments filed 28 February 2005, have been entered and made of record.

### *Response to Amendments and Arguments*

2. Applicant has amended independent claims 1, 14, 23, and 34 to denote that "the illumination is provided at a grazing angle so as to enhance a contrast between surface features of the sample" and that the computing device executes a computer program operable to substantially automatically conduct an analysis of the image to identify features of the sample and determine characteristics of the sample therefrom." In the Examiner's opinion, these added features do not distinguish the claimed invention from the Esrig reference.

The claims merely provide that the illumination is provided at a grazing angle so as to improve contrast between surface features. There are no details of exactly how the illumination is positioned with respect to the sample, nor are there details of specific illumination angle and/or distance from the sample, etc. The claim merely calls for a "grazing angle." Also, the Specification merely states, "the sample 12 is illuminated with a light source at a grazing angle, as depicted by box 104, which accentuates voids and improves surface contrast ..."

(Specification, paragraph 41). Thus, the claims and Specification seem to call for providing illumination at a grazing angle, and such illumination produces improved contrast. There are no details of how the grazing-angle illumination is positioned that distinguishes from Esrig's grazing-angle illumination. Since Esrig's illumination is at a grazing angle, as shown in figure 2,

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the illumination is considered to enhance contrast between surface features just as the claimed grazing-angle illumination enhances contrast.

Applicant argues that Esrig's analysis does not identify features of the sample and determine characteristics of the sample therefrom, as claimed. However, figures 4 and 5 of Esrig clearly show that features of the sample, such as noise and defects, are identified. These features provide an indication of the characteristics of the sample under inspection – i.e. whether the sample contains many defects. In addition, Esrig discloses difference processing that identifies areas free of defects and removes those areas from suspicion (column 6, lines 3-10).

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-4, 6, 7, 8, 23-26, and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 4,755,874 by Esrig et al. ("Esrig").

Regarding claims 1 and 23, Esrig discloses a method/system (figure1) operable to substantially automatically perform an evaluation of a sample of a material according to an established standard, wherein the system comprises:

a microscope (11) operable to magnify the sample;

a light source (29) operable to illuminate the sample, wherein the illumination is provided at a grazing angle so as to enhance a contrast between surface features of the sample;

a stage (9) associated with the microscope and operable to move and position the sample under the microscope for viewing;

an image capturing mechanism (13) operable to capture an image of the sample through the microscope; and

a computing device ("image computer") operable to control magnification by the microscope, control illumination by the light source, receive images from the image capturing device, control movement of the stage, and store and execute a computer program operable to substantially automatically conduct an analysis (see e.g. figures 4 and 5) of the image to identify surface features of the sample and determine characteristics of the sample therefrom, and to generate a report setting forth a result of the analysis.

Regarding claims 2 and 24, Esrig discloses the analysis includes identification and measurement of one or more components of the sample (see figures 4 and 5).

Regarding claims 3 and 25, Esrig discloses the analysis includes identification and measurement of one or more physical features of the sample (see figures 4 and 5).

Regarding claims 4 and 26, Esrig discloses the sample is prepared prior to being magnified by the microscope, wherein such preparation facilitates the analysis (e.g. the sample is properly positioned on the stage).

Regarding claim 6, Esrig discloses the image capturing mechanism is a CCD camera (see column 4, lines 63-68).

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Regarding claims 7 and 28, Esrig discloses the stage is a high-precision two-dimensional stage controlled by the computing device to avoid overlapping fields-of-view (column 4, lines 51-54: the stage 9 moves the module 23 so the objects under inspection are completely within the view of the camera 13 and there is no overlap between the field-of-view of the camera and that of the objects).

Regarding claim 8, Esrig discloses the computer program provides a graphical user interface operable to facilitate a user setting up and initiating the analysis, and to facilitate the user causing the report to be generated (monitor 15 provides a GUI).

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 5 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Esrig in view of U.S. Patent 5,262,967 by Jaber et al. ("Jaber").

Regarding claims 5 and 27, Esrig does not disclose that the material is concrete and the sample is prepared in accordance with the established standard prior to being magnified by the microscope, wherein such preparation includes polishing a face of the sample, and the analysis includes identifying and measuring a number of voids in the sample.

Jaber discloses a system for inspecting an image of a sample of concrete. In particular, Jaber discloses washing, scrubbing, polishing, etc. the sample of concrete (column 3, lines 36-42) and then identifying and measuring a number of voids in the sample (see column 2, lines 32-49).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Esrig by Jaber to inspect concrete as claimed, since Jaber discloses that it is conventional to inspect concrete for quality control purposes.

8. Claims 17 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Esrig in view of Wallack and Mitsuyama, and further in view of U.S. Patent 5,262,967 by Jaber et al. ("Jaber").

Regarding claims 17 and 37, Esrig does not disclose that the material is concrete and the sample is prepared in accordance with the established standard prior to being magnified by the microscope, wherein such preparation includes polishing a face of the sample, and the analysis includes identifying and measuring a number of voids in the sample.

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Jaber discloses a system for inspecting an image of a sample of concrete. In particular, Jaber discloses washing, scrubbing, polishing, etc. the sample of concrete (column 3, lines 36-42) and then identifying and measuring a number of voids in the sample (see column 2, lines 32-49).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Esrig by Jaber to inspect concrete as claimed, since Jaber discloses that it is conventional to inspect concrete for quality control purposes.

9. Claims 9-11, 14-16, 18-20, 29-31, 34-36, 38-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Esrig in view of U. S Patent 6,748,110 by Wallack and U.S. Patent 5,768,412 by Mitsuyama.

Regarding claims 9, 29, 14, and 34, Esrig discloses the method/system of claim 1, wherein the computer program performs a number of different image analysis techniques on the image, including—

a intensity profile segmentation and recognition technique operable to identify a unique characteristic of a profile of the object (figure 4 illustrates an intensity profile that identifies unique characteristics of the object).

Esrig does not appear to disclose a color segmentation and recognition technique operable to facilitate identification and classification of an object in the image, and to differentiate the object from other objects in the image; and



a shape feature segmentation and analysis technique operable to extract the object from the image and to characterize a shape of the object.

Wallack discloses a system for extracting objects from an image of a sample to be inspected. In particular, Wallack discloses performing a segmentation and recognition technique (figure 2) that identifies, classifies, and differentiates objects in the image, as well as characterizing their shapes. For example, figure 3 shows a “blob” of image data being extracted from the sample. The blob is segmented from the rest of the sample and its shape, among other things, is ascertained (see column 4, lines 45-49; column 10, lines 6-20).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Esrig by Wallack to provide a segmentation and recognition technique and a shape feature segmentation and analysis technique, since Wallack shows that such techniques are advantageous for identifying and characterizing objects in samples under inspection and provides more data with which to inspect the samples.

Wallack does not expressly disclose that the segmentation is “color” segmentation. Wallack appears to process greyscale images. However, at the time the invention was made, Mitsuyama shows that it was well-known and obvious to those skilled in the art that region segmentation is applicable to color images, such as those containing separate red, green, and blue signals, and segmentation is advantageously effected on the basis of color.

Regarding claims 10, 30, 19, and 39, Mitsuyama discloses color segmentation and recognition technique is based on RGB (see column 4, lines 55-67).

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Regarding claims 11, 31, 20, and 40, Wallack discloses the segmentation and recognition technique uses a nearest neighbor technique to identify and classify the object (column 8, lines 22-40: the nearest neighbors of an object pixel are examine to identify and classify a blob).

Regarding claims 15 and 35, Esrig disclsoes the analysis includes identification and measurement of one or more components of the sample (see figures 4 and 5).

Regarding claims 16 and 36, Esrig discloses the analysis includes identification and measurement of one or more physical features of the sample (see figures 4 and 5).

Regarding claim 38, Esrig discloses the stage is a high-precision two-dimensional stage controlled by the computing device to avoid overlapping fields-of-view (column 4, lines 51-54: the stage 9 moves the module 23 so the objects under inspection are completely within the view of the camera 13 and there is no overlap between the field-of-view of the camera and that of the objects).

Regarding claim 18, Esrig discloses the computer program provides a graphical user interface operable to facilitate a user setting up and initiating the analysis, and to facilitate the user causing the report to be generated (monitor 15 provides a GUI).

10. Claims 12, 21, 32, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Esrig in view of Wallack and Mitsuyama, and further in view of U.S. Patent 6,151,408 by Oosawa.

Regarding claims 12, 32, 21, and 41, Esrig, Wallack, and Mitsuyama are silent to the color segmentation and recognition technique using a neural network and an associated rulebase to identify and classify the object.

Oosawa discloses a method for separating a region from a color image. In particular, Oosawa discloses segmenting a color region from an image utilizing a neural network and its associated rulebase (step 3, figure 1).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Esrig, Wallack, and Mitsuyama by Oosawa to utilize a neural network and associated rulebase to identify and classify an object, as claimed, since Oosawa teaches that it is conventional to identify and classify color regions in an image using neural networks.

11. Claims 13, 22, 33, and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Esrig in view of Wallack and Mitsuyama, and further in view of "Feature Extraction using Fuzzy Relations for Objects of Various Shapes" by Cho et al. ("Cho").

Regarding claims 13, 33, 22, and 42, Wallack discloses the object is a void and the shape feature segmentation and analysis technique is operable to extract the void from the image and to characterize the shape of the void by correlating a bright area of the void with a dark region of the void (see figure 3 of Wallack – showing that a void is extracted by examining the bright and dark regions of and around the void), and Esrig teaches that the bright area and the dark region are enhanced by the grazing angle of the illumination (see figure 11 of Esrig – showing that the illumination 29 impinges light on the sample at a grazing angle, thereby enhancing the light and dark regions).

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Wallack does not disclose that the shape of the void is extracted from the image using a fuzzy logic correlator, as claimed.

Cho discloses an object recognition system that identifies the shapes of objects in an image using fuzzy logic (see Abstract).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Esrig, Wallack, and Mitsuyama by Cho to characterize the shape of the void using fuzzy logic, as claimed, since Cho shows that it is conventional to utilize fuzzy logic to characterize an object's shape and utilizing fuzzy logic in this manner increases the performance of an object recognition system (see Abstract).

### ***Conclusion***

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Colin M. LaRose whose telephone number is (571) 272-7423. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au, can be reached on (571) 272-7414. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306. (After July 15, 2005, the fax number will be changed to (571)-273-8300.) Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the TC 2600 Customer Service Office whose telephone number is (571) 272-2600.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CML  
Group Art Unit 2623  
20 June 2005



VIKKRAM BALI  
PRIMARY EXAMINER